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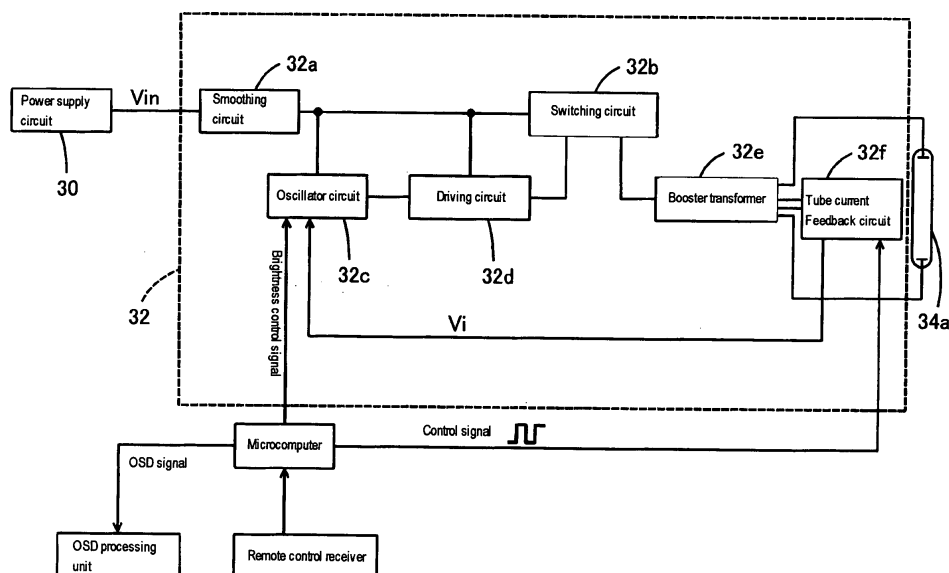
(71) Applicant: **Funai Electric Co., Ltd.**  
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(54) **Liquid crystal display apparatus and liquid crystal television**

(57) The present invention discloses a liquid crystal display apparatus and a liquid crystal television that control the lighting of the backlight to reduce the power consumption and inform the user that the lighting is controlled while no video signal is inputted, enabling to realize the energy saving without impairing the user's convenience. When the microcomputer detects that no video signal is

inputted, it stabilizes the oscillation duty ratio of the control circuit 32c at an oscillation frequency lower than a predetermined value by decreasing the duty ratio of the brightness control signal inputted in the control circuit 32c and by shifting the feedback tube current  $I_{sen}$  that is feedbacked from the tube current feedback circuit 32f to the high current side.

**FIG. 2**





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| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                            |                                                 |                                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-----------------------------------------------------------------------|
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Citation of document with indication, where appropriate, of relevant passages                                                                                                                              | Relevant to claim                               | CLASSIFICATION OF THE APPLICATION (IPC)                               |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | EP 1 718 132 A1 (SUMIDA CORP [JP])<br>2 November 2006 (2006-11-02)<br>* paragraph [0001] *<br>* paragraph [0034] - paragraph [0057];<br>figure 1 *<br>* paragraph [0097] - paragraph [0106];<br>figure 3 * | 1-5                                             | INV.<br>H05B41/282<br>H05B41/392<br>H05B41/42<br><br>ADD.<br>G09G3/34 |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | US 2006/049780 A1 (HSIEH KUAN-HONG [TW])<br>9 March 2006 (2006-03-09)<br>* paragraphs [0017] - [0024]; figures 1-4<br>*                                                                                    | 1-5                                             |                                                                       |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | US 2006/007225 A1 (KIM YOUNG-CHAN [KR])<br>12 January 2006 (2006-01-12)<br>* paragraphs [0023] - [0035]; figures 1,2<br>*                                                                                  | 1-5                                             |                                                                       |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | US 2004/207339 A1 (LIN YUNG-LIN [US] ET AL)<br>21 October 2004 (2004-10-21)<br>* paragraphs [0032] - [0034]; figure 8 *<br>* paragraph [0039]; figure 9 *                                                  | 5                                               | TECHNICAL FIELDS SEARCHED (IPC)                                       |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | US 2004/239609 A1 (LEE CHANG-HUN [KR] ET AL)<br>2 December 2004 (2004-12-02)<br>* paragraphs [0081] - [0096]; figure 7 *                                                                                   | 1,5                                             | H05B<br>G09G                                                          |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | US 2006/206734 A1 (HORI MASANORI [JP])<br>14 September 2006 (2006-09-14)<br>* paragraphs [0030] - [0033]; figures 1,2<br>*<br>* paragraph [0037]; figure 9 *                                               | 1,5                                             |                                                                       |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | JP 2006 140647 A (SHARP KK)<br>1 June 2006 (2006-06-01)<br>* abstract *                                                                                                                                    | 1,5                                             |                                                                       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                            | -/--                                            |                                                                       |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                            |                                                 |                                                                       |
| Place of search<br>Munich                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                            | Date of completion of the search<br>29 May 2013 | Examiner<br>Ferla, Monica                                             |
| CATEGORY OF CITED DOCUMENTS<br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document<br>T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>& : member of the same patent family, corresponding document |                                                                                                                                                                                                            |                                                 |                                                                       |

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Application Number  
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| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                         |                                                 |                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-----------------------------------------|
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Citation of document with indication, where appropriate, of relevant passages                                                                                                           | Relevant to claim                               | CLASSIFICATION OF THE APPLICATION (IPC) |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | EP 0 730 371 A2 (SONY CORP [JP])<br>4 September 1996 (1996-09-04)<br>* column 3, line 51 - column 6, line 33;<br>figures 2,3 *                                                          | 1,5                                             |                                         |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | -----<br>EP 1 401 091 A1 (MATSUSHITA ELECTRIC IND CO LTD [JP]) 24 March 2004 (2004-03-24)<br>* paragraphs [0098] - [0105]; figures 1-3<br>*<br>* paragraphs [0120] - [0125]; figure 9 * | 1,5                                             |                                         |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | -----<br>US 5 078 476 A (SHIN JONG K [KR])<br>7 January 1992 (1992-01-07)<br>* column 2, line 20 - column 4, line 63;<br>figures 1,2 *                                                  | 1,5                                             |                                         |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | -----<br>US 6 411 040 B1 (ERTL BERNHARD [DE] ET AL)<br>25 June 2002 (2002-06-25)<br>* column 3, line 36 - column 5, line 65;<br>figure 1 *                                              | 2,3                                             |                                         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                         |                                                 | TECHNICAL FIELDS SEARCHED (IPC)         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                         |                                                 |                                         |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                         |                                                 |                                         |
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 2  
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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| Patent document<br>cited in search report |    | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|----|---------------------|----------------------------|---------------------|
| EP 1718132                                | A1 | 02-11-2006          | AT 419733 T                | 15-01-2009          |
|                                           |    |                     | CN 1856203 A               | 01-11-2006          |
|                                           |    |                     | EP 1718132 A1              | 02-11-2006          |
|                                           |    |                     | JP 2006302628 A            | 02-11-2006          |
|                                           |    |                     | KR 20060110752 A           | 25-10-2006          |
|                                           |    |                     | TW I312263 B               | 11-07-2009          |
|                                           |    |                     | US 2006238939 A1           | 26-10-2006          |
| -----                                     |    |                     |                            |                     |
| US 2006049780                             | A1 | 09-03-2006          | TW I333187 B               | 11-11-2010          |
|                                           |    |                     | US 2006049780 A1           | 09-03-2006          |
| -----                                     |    |                     |                            |                     |
| US 2006007225                             | A1 | 12-01-2006          | CN 101015204 A             | 08-08-2007          |
|                                           |    |                     | EP 1766967 A1              | 28-03-2007          |
|                                           |    |                     | KR 20060000341 A           | 06-01-2006          |
|                                           |    |                     | US 2006007225 A1           | 12-01-2006          |
|                                           |    |                     | WO 2006001626 A1           | 05-01-2006          |
| -----                                     |    |                     |                            |                     |
| US 2004207339                             | A1 | 21-10-2004          | CN 1538793 A               | 20-10-2004          |
|                                           |    |                     | CN 2664338 Y               | 15-12-2004          |
|                                           |    |                     | HK 1069708 A1              | 29-02-2008          |
|                                           |    |                     | TW I242177 B               | 21-10-2005          |
|                                           |    |                     | US 2004207339 A1           | 21-10-2004          |
|                                           |    |                     | US 2004263092 A1           | 30-12-2004          |
|                                           |    |                     | US 2005212790 A1           | 29-09-2005          |
|                                           |    |                     | US 2006202635 A1           | 14-09-2006          |
|                                           |    |                     | US 2009039796 A1           | 12-02-2009          |
| -----                                     |    |                     |                            |                     |
| US 2004239609                             | A1 | 02-12-2004          | KR 20040101622 A           | 03-12-2004          |
|                                           |    |                     | US 2004239609 A1           | 02-12-2004          |
| -----                                     |    |                     |                            |                     |
| US 2006206734                             | A1 | 14-09-2006          | JP 2006254185 A            | 21-09-2006          |
|                                           |    |                     | US 2006206734 A1           | 14-09-2006          |
| -----                                     |    |                     |                            |                     |
| JP 2006140647                             | A  | 01-06-2006          | NONE                       |                     |
| -----                                     |    |                     |                            |                     |
| EP 0730371                                | A2 | 04-09-1996          | EP 0730371 A2              | 04-09-1996          |
|                                           |    |                     | IN 192868 A1               | 22-05-2004          |
|                                           |    |                     | JP 3764504 B2              | 12-04-2006          |
|                                           |    |                     | JP H08237579 A             | 13-09-1996          |
|                                           |    |                     | US 6111559 A               | 29-08-2000          |
| -----                                     |    |                     |                            |                     |
| EP 1401091                                | A1 | 24-03-2004          | EP 1401091 A1              | 24-03-2004          |
|                                           |    |                     | JP 4227892 B2              | 18-02-2009          |
|                                           |    |                     | US 2004100592 A1           | 27-05-2004          |
|                                           |    |                     | WO 03003555 A1             | 09-01-2003          |
| -----                                     |    |                     |                            |                     |

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 08 00 8037

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

29-05-2013

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|---------------------|----------------------------|---------------------|
| US 5078476 A                              | 07-01-1992          | GB 2235847 A               | 13-03-1991          |
|                                           |                     | US 5078476 A               | 07-01-1992          |
| -----                                     |                     |                            |                     |
| US 6411040 B1                             | 25-06-2002          | CA 2232328 A1              | 18-09-1998          |
|                                           |                     | DE 19711183 A1             | 24-09-1998          |
|                                           |                     | EP 0866646 A2              | 23-09-1998          |
|                                           |                     | HU 9800595 A2              | 28-10-1998          |
|                                           |                     | JP H10270190 A             | 09-10-1998          |
|                                           |                     | US 6411040 B1              | 25-06-2002          |
| -----                                     |                     |                            |                     |